NSRDS—NBS 3, Section 8

U.S. DEPARTMENT OF COMMERCE / National Bureau of Standards

Selected Tables of Atomic Spectra

Atomic Energy Levels and Multiplet Tables

O VI, O VII, O VIII

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[1]Headquarters and Laboratories at Gaithersburg, Maryland, unless otherwise noted; mailing address Washington,D.C. 20234.
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The National Bureau of Standards was reorganized, effective April 9, 1978.

Selected Tables of Atomic Spectra

A Atomic Energy Levels - Second Edition

B Multiplet Tables

O VI, O VII, O VIII

Data Derived from the Analyses of Optical Spectra

Charlotte E. Moore

Office of Standard Reference Data
National Bureau of Standards
Washington, D.C. 20234

U.S. Naval Research Laboratory
E. O. Hulbert Center for Space Research
Washington, D.C. 20375

U.S. DEPARTMENT OF COMMERCE, Juanita M. Kreps, Secretary

Dr. Sidney Harman, Under Secretary

Jordan J. Baruch, Assistant Secretary for Science and Technology

NATIONAL BUREAU OF STANDARDS, Ernest Ambler, Director

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Abstract

The present publication is the eighth section of a series being prepared in response to the need for a current revision of two sets of the author's tables containing data on atomic spectra as derived from analyses of optical spectra. As in the previous Sections, Part A contains the atomic energy levels and Part B the multiplet tables. Section 8 includes these data for O VI, O VII, O VIII, thereby completing the spectra of oxygen. The form of presentation is described in detail in the text to Section 1.

Key words: Atomic energy levels, O VI–O VIII; atomic spectra, O VI–O VIII; multiplet tables, O VI–O VIII; oxygen spectra, O VI–O VIII; spectra, O VI–O VIII; wavelengths, O VI–O VIII.

Foreword

The National Standard Reference Data System provides access to the quantitative data of physical science, critically evaluated and compiled for convenience and readily accessible through a variety of distribution channels. The System was established in 1963 by action of the President's Office of Science and Technology and the Federal Council for Science and Technology, and responsibility to administer it was assigned to the National Bureau of Standards.

NSRDS receives advice and planning assistance from a Review Committee of the National Research Council of the National Academy of Sciences-National Academy of Engineering. A number of Advisory Panels, each concerned with a single technical area, meet regularly to examine major portions of the program, assign relative priorities, and identify specific key problems in need of further attention. For selected specific topics, the Advisory Panels sponsor subpanels which make detailed studies of users' needs, the present state of knowledge, and existing data resources as a basis for recommending one or more data compilation activities. This assembly of advisory services contributes greatly to the guidance of NSRDS activities.

The System now includes a complex of data centers and other activities in academic institutions and other laboratories. Components of the NSRDS produce compilations of critically evaluated data, reviews of the state of quantitative knowledge in specialized areas, and computations of useful functions derived from standard reference data. The centers and projects also establish criteria for evaluation and compilation of data and recommend improvements in experimental techniques. They are normally associated with research in the relevant field.

The technical scope of NSRDS is indicated by the categories of projects active or being planned: nuclear properties, atomic and molecular properties, solid state properties, thermodynamic and transport properties, chemical kinetics, and colloid and surface properties.

Reliable data on the properties of matter and materials are a major foundation of scientific and technical progress. Such important activities as basic scientific research, industrial quality control, development of new materials for building and other technologies, measuring and correcting environmental pollution depend on quality reference data. In NSRDS, the Bureau's responsibility to support American science, industry, and commerce is vitally fulfilled.

E. Ambler.

ERNEST AMBLER, *Director*

Preface

The present publication is the eighth section of a series that is being prepared in response to the increasing demand for a current revision of two sets of tables containing data on atomic spectra as derived from analyses of optical spectra.

The first set, Atomic Energy Levels, NBS Circular 467, consists of three volumes published, respectively, in 1949, 1952 and 1958. This Circular has been reprinted as NSRDS-NBS 35, Volumes I, II and III.

The second set consists of two Multiplet Tables; one published in 1945 by the Princeton University Observatory, containing multiplets having wavelengths longer than 3000 Å; the other, An Ultraviolet Multiplet Table, NBS Circular 488, appearing in five Sections, the first in 1950, the second in 1952, and the others in 1962. The Princeton Multiplet Table was reprinted in 1972 as NSRDS-NBS 40.

The present series includes both sets of data, the energy levels and multiplet tables, as Parts A and B, respectively, for selected spectra contained in Volume I of "Atomic Energy Levels." The sections are being published at irregular intervals as revised analyses become available. A flexible paging permits the arrangement of the various sections by atomic number, regardless of the order in which the separate spectra are published. Section 1 includes three spectra of silicon, Z=14: Si II, Si III, Si IV. Section 2 contains similar data for Si I. Section 3 covers all spectra of carbon, Z=6: C I, C II, C III, C IV, C V, C VI. Section 4 includes the last four spectra of nitrogen, Z=7: N IV, N V, N VI, N VII. Section 5 completes the spectra of nitrogen, N I, N II, N III. Section 6 contains the spectra of hydrogen, Z=1: H I, D, T. Section 7 contains the first spectrum of oxygen, Z=8: O I. The present Section, 8, contains the last three spectra of oxygen, Z=8: O VI, O VII, O VIII. The form of presentation of the data is described in detail in the text of Section 1. All sections are arranged identically, and the same conversion factor, cm^{-1} to eV, 0.000123981 is used throughout.

The manuscript has been prepared by Charlotte E. Moore, who published the earlier tables. She appreciates the cordial cooperation of numerous atomic spectroscopists. She is particularly indebted to B. Edlén and I. Martinson in Lund, Sweden, W. C. Martin and V. Kaufman in the Spectroscopy Section of this Bureau, and to D. R. Lide and his staff for their cordial collaboration in publishing this material.

Washington, D. C., June 1978.

Contents

Part A—Atomic Energy Levels

Part B—Multiplet Tables

NSRDS-NBS 3, SECTION 8

OXYGEN Z=8

Part A

OXYGEN

O VI

Li I sequence; 3 electrons $Z=8$

Ground state $1s^2\ 2s\ ^2S_{0 1/2}$

$2s\ ^2S_{0 1/2}$ **1114010** cm^{-1}; 89.766 Å (Vac) I P 138.116 eV

The analysis by Edlén published in "Atomic Energy Levels" is essentially unchanged. From additional observations by various authors it has been extended and slightly revised with regard to calculated wavelengths.

The present list of energy levels has been derived from a square array based on the 1974 analysis and extended by means of a current list of classified lines compiled from the literature. The limit is from the 1963 paper by Bockasten, Hallin, and Hughes.

The observations are not homogeneous, and predicted wavelengths are subject to considerable error. The extrapolated levels by Edlén, entered in brackets in the earlier list, have been adjusted in some cases to conform to the present array of energy levels. This may not be an improvement, but it provides a self-contained summary that includes the present observations.

Some special comments on individual papers should be noted. The resonance lines have been measured by Ryabtsev at: λλ 1031.924±0.005 and 1037.614±0.005 Å. Three lines reported by Pospieszczyk are not entered in part B: λλ 21.63, 21.66, and 21.70 Å. They are classified as $1s^2\ nl\ ^2L - 1s\ 2p^2\ ^2(L\pm1)$. Similarly, three lines listed by Matthews and his associates have been omitted from the Multiplet Table:

λ(Å)	Designation	
15.572	$1s\ 3s^2\ ^2S$ —	$3s^2\ 4p\ ^2P°$
16.350	$1s\ 3p^2$ —	$3p^3$
18.092	$1s^2 3s$ —	$1s 3s\ 4p$

More observations are needed to connect the designated levels with the known levels.

Gabriel and Jordan have observed a number of O VI lines in laboratory plasmas as long wavelength satellites to the He-like ion resonance lines.

The observations reported by Pegg and others on "Electron Decay-in-Flight Spectra, etc." have not been included here. Classifications in the "Spectra of Autoionization Electrons, etc." by Berry and others have also been omitted.

The assignment of higher limit terms in the list of energy levels is somewhat arbitrary and may require revision.

An effort has been made to indicate the present interpretation of the spectrum by various authors, including term designations in some cases where only general configuration assignments have meaning. As work goes on, a more suitable format can doubtless be developed.

Note added in press: The 1978 reference on "The Quartet Term System of Doubly Excited O VI."

O VI—Continued

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O VI

Config.	Desig.	J	Level	Interval
$1s^2\,2s$	$2s\ ^2S$	0½	0.0	
$1s^2\,2p$	$2p\ ^2P°$	0½	96375.0	532.5
		1½	96907.5	
$1s^2\,3s$	$3s\ ^2S$	0½	640039.8	
$1s^2\,3p$	$3p\ ^2P°$	0½	666113.2	156.6
		1½	666269.8	
$1s^2\,3d$	$3d\ ^2D$	1½	674625.7	51.1
		2½	674676.8	
$1s^2\,4s$	$4s\ ^2S$	0½	852696	
$1s^2\,4p$	$4p\ ^2P°$	0½	863333.8	63.9
		1½	863397.7	
$1s^2\,4d$	$4d\ ^2D$	1½	866880.1	21.4
		2½	866901.5	
$1s^2\,4f$	$4f\ ^2F°$	2½	867077.7	9.3
		3½	867087.0	
$1s^2\,5s$	$5s\ ^2S$	0½	948690	
$1s^2\,5p$	$5p\ ^2P°$	0½, 1½	954080	
$1s^2\,5d$	$5d\ ^2D$	1½	955851	9
		2½	955860	
$1s^2\,5f$ etc.	$5f\ ^2F°$ to $5g\ ^2G$	2½ to 4½	955985	
$1s^2\,6s$	$6s\ ^2S$	0½	1000080	
$1s^2\,6p$	$6p\ ^2P°$	0½, 1½	1003130	
$1s^2\,6d$	$6d\ ^2D$	1½	1004170	14
		2½	1004184	
$1s^2\,6f$	$6f\ ^2F°$	2½, 3½	[1004265]	
$1s^2\,6g$ etc.	$6g\ ^2G$ to $6h\ ^2H°$	3½ to 5½	[1004276]	
$1s^2\,7s$ etc.	$7s\ ^2S$	0½	1030780	
$1s^2\,7p$	$7p\ ^2P°$	0½, 1½	1032630	
$1s^2\,7d$	$7d\ ^2D$	1½	1033310	24
		2½	1033334	
$1s^2\,7f$	$7f\ ^2F°$	2½, 3½	[1033382]	
$1s^2\,7g$ etc.	$7g\ ^2G$, $7h\ ^2H°$, $7i\ ^2I$	3½ to 6½	[1033389]	
$1s^2\,8s$	$8s\ ^2S$	0½	[1050543]	
$1s^2\,8p$	$8p\ ^2P°$	0½, 1½	1051724	
$1s^2\,8f$	$8f\ ^2F°$	2½, 3½	[1052280]	
$1s^2\,8g$ etc.	$8g\ ^2G$, $8h\ ^2H°$, $8i\ ^2I$, $8k\ ^2K°$	3½ to 7½	[1052285]	
$1s^2\,8d$	$8d\ ^2D$	1½	1052288	13
		2½	1052301	

O VI—Continued

Config.	Desig.	J	Level	Interval
$1s^2\ 9p$	$9p\ ^2P^o$	0½ 1½	1064793	
$1s^2\ 9h$ etc.	$9h\ ^2H^o$ $9i\ ^2I$ $9k\ ^2K^o$	4½ to 7½	[1065207]	
$1s^2\ 9d$	$9d\ ^2D$	1½ 2½	1065311 1065337	26
$1s^2\ 10d$	$10d\ ^2D$	1½ 2½	 1074425	
$1s^2\ 10h$ etc.	$10h\ ^2H^o$ ^2I $^2K^o$	4½ to 7½	[1074532]	
$1s^2\ 10p$	$10p\ ^2P^o$	0½ 1½	[1074922]	
$1s^2\ 11d$	$11d\ ^2D$	1½ 2½	 1081451	
$1s^2\ 12h$ etc.	$12h\ ^2H^o$ etc.	4½ etc.	[1086514]	
	....	......	....	
O VII ($^1S_0$)	***Limit***	....	**1114010**	
$1s\ 2s\ (^3S)\ 2p$	$2p'\ ^4P^o$	0½ 1½ 2½	4470270	
$1s\ 2s\ (^3S)\ 2p$	$2p'\ ^2P^o$	0½ 1½	4537620	
$1s\ 2s\ (^1S)\ 2p$	$2p''\ ^2P^o$	0½ 1½	4541330	
$1s\ 2p^2$	$2p^2\ ^4P$	0½ 1½ 2½	[4575010]	
$1s\ 2p\ (^3P^o)\ 2s$	$2p\ 2s\ ^2P^o$	0½ 1½	4582950	
$1s\ 2p\ (^1P^o)\ 2s$	$2p\ 2s'\ ^2P^o$	0½ 1½	4591370	
$1s\ 2p^2$	$2p^2\ ^2D$	1½ 2½	4617530	

O VI—Continued

Config.	Desig.	J	Level	Interval
$1s\ 2p^2$	$2p^2\ ^2P$	0½ 1½	4643820	
$1s\ 2p^2$	$2p^2\ ^2S$	0½	4696550	
$1s\ 2s\ 3s$	$2s\ 3s\ ^4S$	1½	5129900	
$1s\ 2s\ 3d$	$2s\ 3d\ ^4D$	0½ to 3½	5182010	
$1s\ 2d\ 3d$	$2d\ 3d\ ^4D$	0½ to 3½	5197910	
$1s\ 2p\ 3s$	$2p\ 3s\ ^4P^o$	0½ to 2½	[5202760]	
$1s\ 2s\ 4d$	$2s\ 4d\ ^4D$	0½ to 3½	5214870	
$1s\ 2p\ 3d$	$2p\ 3d\ ^2D^o$	1½ 2½	5254130	
$1s\ 2p\ 3d$	$2p\ 3d\ ^4D^o$	0½ to 3½	[5254360]	
$1s\ 2p\ 3d$	$2p\ 3d\ ^4P^o$	0½ 1½ 2½	[5260970]	
$1s\ 2p(^1P^o)3p$	$2p\ 3p\ ^2D$	1½ 2½	5272390	
$1s\ 2p(^1P^o)3p$	$2p\ 3p\ ^2S$	0½	5272390	
$1s\ 2p\ 4d$	$2p\ 4d\ ^4D^o$	0½ to 3½	[5450280]	
$1s\ 2s\ 8p$	$2s\ 8p\ ^4P^o$	0½ 1½ 2½	[5450280]	
$1s\ 2s\ 9p$	$2s\ 9p\ ^4P^o$	0½ 1½ 2½	[5490170]	
$2p^3$	$2p^3\ ^2P^o$	0½ 1½	9732880	

June 1978

Part B OXYGEN

O VI (Z=8)

I P 138.116 eV   Limit 1114010 cm^{-1} 89.766 Å (Vac)

Anal A   List A   June 1978

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P   Predicted wavelength

[P]   A theoretical value of either or both energy levels of the transition has been used in deriving the predicted wavelength.

‡   Raie Ultime

* and §   Blend of O VI and O VII

O VI

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
1031.928‡	B	10	0.00	12.01	0½ -1½	$2s\ ^2S-2p\ ^2P^o$
1037.618	B	9	0.00	11.95	0½ -0½	UV 1
150.089	A	13	0.00	82.60	0½ -1½	$2s\ ^2S-3p\ ^2P^o$
150.124	A	12	0.00	82.59	0½ -0½	UV 2
148.218	A	1*d*	0.00	83.65	0½ -2½	$2s\ ^2S-3d\ ^2D$
						UV 1F
115.822	A	9	0.00	107.04	0½ -1½	$2s\ ^2S-4p\ ^2P^o$
115.830	A	8	0.00	107.04	0½ -0½	UV 2.01
104.813	A	7	0.00	118.29	0½-	$2s\ ^2S-5p\ ^2P^o$
						UV 2.02
99.688	A	5*d*	0.00	124.37	0½-	$2s\ ^2S-6p\ ^2P^o$
						UV 2.03
96.840	A	4*d*	0.00	128.03	0½-	$2s\ ^2S-7p\ ^2P^o$
						UV 2.04
95.082	A	3*d*	0.00	130.39	0½-	$2s\ ^2S-8p\ ^2P^o$
						UV 2.05
93.915	A	2*d*	0.00	132.01	0½-	$2s\ ^2S-9p\ ^2P^o$
						UV 2.06
93.03	H	2	0.00	133.27	0½-	$2s\ ^2S-10p\ ^2P^o$
						UV 2.07
22.370	D		0.00	554.23	0½-	$2s\ ^2S-2p'\ ^4P^o$
						UV 2.08
22.038	D		0.00	562.58	0½-	$2s\ ^2S-2p'\ ^2P^o$
						UV 2.09
22.02	G		0.00	563.04	0½-	$2s\ ^2S-2p''\ ^2P^o$
						UV 2.10
21.82	G		0.00	568.20	0½-	$2s\ ^2S-2p\,2s\ ^2P^o$
						UV 2.11
21.78	G		0.00	569.24	0½-	$2s\ ^2S-2p\,2s'\ ^2P^o$
						UV 2.12
184.117	A	10	12.01	79.35	1½ -0½	$2p\ ^2P^o-3s\ ^2S$
183.937	A	9	11.95	79.35	0½ -0½	UV 3
173.082	A	14	12.01	83.65	1½ -2½	$2p\ ^2P^o-3d\ ^2D$
172.935	A	13	11.95	83.64	0½ -1½	UV 4
132.312	A	6	12.01	105.72	1½ -0½	$2p\ ^2P^o-4s\ ^2S$
132.219	A	5	11.95	105.72	0½ -0½	UV 4.01
129.871	A	11	12.01	107.48	1½ -2½	$2p\ ^2P^o-4d\ ^2D$
129.785	A	10	11.95	107.48	0½ -1½	UV 5
117.401	A	3	12.01	117.62	1½ -0½	$2p\ ^2P^o-5s\ ^2S$
117.327	A	2	11.95	117.62	0½ -0½	UV 6
116.666	A	1	12.01	118.29	1½-	$2p\ ^2P^o-5p\ ^2P^o$
						UV 2F

O VI

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
116.421	A	7*d*	12.01	118.51	1½ -2½	$2p\ ^2P^o-5d\ ^2D$
116.350	A	6*d*	11.95	118.51	0½ -1½	UV 7
110.721	A	2	12.01	123.99	1½ -0½	$2p\ ^2P^o-6s\ ^2S$
110.655	A	1	11.95	123.99	0½ -0½	UV 8
110.220	A	5*d*	12.01	124.50	1½ -2½	$2p\ ^2P^o-6d\ ^2D$
110.157	A	4*d*	11.95	124.50	0½ -1½	UV 9
107.081	A	1	12.01	127.80	1½ -0½	$2p\ ^2P^o-7s\ ^2S$
						UV 10
106.789	A	4*d*	12.01	128.11	1½ -2½	$2p\ ^2P^o-7d\ ^2D$
106.731	A	3*d*	11.95	128.11	0½ -1½	UV 11
[104.862]	P		12.01	130.25	1½ -0½	$2p\ ^2P^o-8s\ ^2S$
						UV 12
104.669	A	3*d*	12.01	130.47	1½ -2½	$2p\ ^2P^o-8d\ ^2D$
104.612	A	2*d*	11.95	130.46	0½ -1½	UV 13
103.260	A	2*d*	12.01	132.08	1½ -2½	$2p\ ^2P^o-9d\ ^2D$
103.206	A	1*d*	11.95	132.08	0½ -1½	UV 14
102.30	H	3	12.01	133.21	1½ -2½	$2p\ ^2P^o-10d\ ^2D$
						UV 15
101.57	H	2	12.01	134.08	1½ -2½	$2p\ ^2P^o-11d\ ^2D$
						UV 16
22.33	P		11.99	567.21		$2p\ ^2P^o-2p^2\ ^4P$
						UV 17
22.12	G		11.99	572.49		$2p\ ^2P^o-2p^2\ ^2D$
						UV 18
21.74	G		11.99	582.28	-0½	$2p\ ^2P^o-2p^2\ ^2S$
						UV 19
Air						
3811.35	B	2	79.35	82.60	0½ -1½	$3s\ ^2S-3p\ ^2P^o$
3834.24	B	1	79.35	82.59	0½ -0½	1
Vac						
447.712	B	0	79.35	107.04	0½ -1½	$3s\ ^2S-4p\ ^2P^o$
447.840	B	0-	79.35	107.04	0½ -0½	UV 20
498.431	B	1*d*	82.60	107.48	1½ -2½	$3p\ ^2P^o-4d\ ^2D$
498.090	B	0*d*	82.59	107.48	0½ -1½	UV 21
21.71	G		82.60	653.68		$3p\ ^2P^o-2p\,3p\ ^2D$
						UV 22
519.723	B	2+*d*	83.65	107.50	2½ -3½	$3d\ ^2D-4f\ ^2F^o$
519.610	B	2*d*	83.64	107.50	1½ -2½	UV 23
1125	I		107.48	118.52		$4d\ ^2D-5f\ ^2F^o$
			107.50	118.52		$4f\ ^2F^o-5g\ ^2G$
						UV 24

O VI—Continued

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
729	1		107.48 107.50	124.51 124.51		$4d\ ^2D-6f\ ^2F^\circ$ $4f\ ^2F^\circ-6g\ ^2G$ UV 25
601	I		107.48 107.50	128.12 128.12		$4d\ ^2D-7f\ ^2F^\circ$ $4f\ ^2F^\circ-7g\ ^2G$ UV 26
Air						
2069.92	C	5	118.52	124.51		$5f\ ^2F^\circ-6g\ ^2G$
2070.29	C	4	118.52	124.51		$5g\ ^2G-6h\ ^2H^\circ$ UV 27
3071	P		123.99	128.03	0½–	$6s\ ^2S-7p\ ^2P^\circ$ 2
3616	P		124.37	127.80	–0½	$6p\ ^2P^\circ-7s\ ^2S$ 3
3311	P		124.37	128.11		$6p\ ^2P^\circ-7d\ ^2D$ 4
3514	P		124.50	128.03		$6d\ ^2D-7p\ ^2P^\circ$ 5
[3423]	P		124.50	128.12		$6d\ ^2D-7f\ ^2F^\circ$ 6
[3440]	P		124.51	128.11		$6f\ ^2F^\circ-7d\ ^2D$ 7
3433.69	C	5	124.51	128.12		$6f\ ^2F^\circ-7g\ ^2G$ $6g\ ^2G-7h\ ^2H^\circ$ $6h\ ^2H^\circ-7i\ ^2I$ 8
2082.18	C	2	124.51	130.46		$6f\ ^2F^\circ-8g\ ^2G$ $6g\ ^2G-8h\ ^2H^\circ$ $6h\ ^2H^\circ-8i\ ^2I$ UV 28
4773	P		127.80	130.39	0½–	$7s\ ^2S-8p\ ^2P^\circ$ 9
[5581]	P		128.03	130.25	–0½	$7p\ ^2P^\circ-8s\ ^2S$ 10
5084	P		128.03	130.47		$7p\ ^2P^\circ-8d\ ^2D$ 11
5433	P		128.11	130.39		$7d\ ^2D-8p\ ^2P^\circ$ 12

O VI—Continued

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Air						
[5274]	P		128.11	130.46		$7d\ ^2D-8f\ ^2F^\circ$ 13
[5289]	P		128.12	130.46		$7f\ ^2F^\circ-8g\ ^2G$ 14
[5286]	P		128.12	130.47		$7f\ ^2F^\circ-8d\ ^2D$ 15
5290.60	C	5	128.12	130.46		$7g\ ^2G-8h\ ^2H^\circ$ $7h\ ^2H^\circ-8i\ ^2I$ $7i\ ^2I-8k\ ^2K^\circ$ 16
3142	E		128.12	132.07		$7g\ ^2G-9h\ ^2H^\circ$ etc.–etc. 17
2428	E		128.12	133.22		$7g\ ^2G-10h\ ^2H^\circ$ etc.–etc. UV 29
4500	E		130.46	133.22		$8g\ ^2G-10h\ ^2H^\circ$ etc.–etc. 18
4692	E		132.07	134.71		$9g\ ^2G-12h\ ^2H^\circ$ etc.–etc. 19
Vac						
151.6	K		554.23	636.01		$2p\ ^4P^\circ-2s\ 3s\ ^4S$ UV 30
140.5	K		554.23	642.47		$2p\ ^4P^\circ-2s\ 3d\ ^4D$ UV 31
*137.43§	J	(80)	554.23	644.44		$2p\ ^4P^\circ-2d\ 3d\ ^4D$ UV 32
134.3	J	(30)	554.23	646.54		$2p\ ^4P^\circ-2s\ 4d\ ^4D$ UV 33
159.3	K		567.21	645.04		$2p^2\ ^4P-2p\ 3s\ ^4P^\circ$ UV 34
147.2	K		567.21	651.44		$2p^2\ ^4P-2p\ 3d\ ^4D^\circ$ UV 35
145.78	J	(160)	567.21	652.26		$2p^2\ ^4P-2p\ 3d\ ^4P^\circ$ UV 36
*114.25§	J	(50)	567.21	675.73		$2p^2\ ^4P-2p\ 4d\ ^4D^\circ$ UV 37

O VI—Continued

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
*114.25§	J	(50)	567.21	673.73		$2p^2\ {}^4P-2s\ 8p\ {}^4P^o$ UV 38
*109.27§	J	(40)	567.21	680.78		$2p^2\ {}^4P-2s\ 9p\ {}^4P^o$ UV 39
19.549	D		572.49	1207		$2p^2\ {}^2D-2p^3\ {}^2P^o$ UV 40

O VI—Continued

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
*163.85§	J	(150)	575.75	651.41		$2p^2\ {}^2P-2p\ 3d\ {}^2D^o$ UV 41
19.650	D		575.75	1207		$2p^2\ {}^2P-2p^3\ {}^2P^o$ UV 42

NSRDS-NBS 3, SECTION 8

OXYGEN $Z=8$

A O VII Atomic Energy Levels

B O VII Multiplet Table

Part A OXYGEN

O VII

He I sequence; 2 electrons $Z=8$

Ground state $1s^2\ {}^1S_0$

$1s^2\ {}^1S_0$ **5962800±300** cm^{-1}; 16.771 Å (Vac) I P 739.274±0.037 eV

The observations are from various sources, but the analysis is confirmed by theory. A. M. Cantú and his associates have extended the early work of Tyrén and Edlén in the grazing-incidence region by "Focusing a Q-switched 1-GW ruby laser on a solid target and detecting the emitted radiation." From these observations they derive the ionization limit quoted above, which agrees well with Tyrén's early value 5963000±600 cm^{-1}.

The writer has prepared a line list from the wavelengths quoted in Part B and derived the tabulated energy levels from a square array of combinations based on this list. Except for three lines near 1600 Å, the line list extends from 137 Å to 15 Å. Most energy levels might well be listed to fewer significant figures.In the paper by Cantú and others a probable error of 0.007 Å is given for most of their observed lines. The data are not homogeneous but provide a general summary of the analysis.

Brackets denote calculated energy levels. The entries for the terms $np\ {}^3P^\circ(n=8\text{–}10)$ and $10d\ {}^3D$ are from calculated wavelengths listed by Fawcett. The values for the terms $nd\ {}^3D(n=4\text{–}10)$ have been determined from combinations with $2p\ {}^3P^\circ$ by using the center of gravity, 4585980 cm^{-1}, for this term.

The levels above the ionization limit involve two-electron excitation. They are based on the observations between 15 Å and 19 Å reported by Matthews and his associates. One line, 19.069 Å, classified by these authors as $1s\ 3p-2p\ 3p$ has not been utilized in the present compilation, pending further clarification. The term that they designate as $2p^2\ {}^1P$ is entered here as $2p^2\ {}^1D$.

Hallin and others have reported eight lines of O VII between 2306 Å and 4562 Å observed in beam-foil spectra of oxygen ions at beam energies of 6-42 MeV. They define these lines by the principal quantum numbers n and n' as follows:

λ(Å)exp	n	n'	λ(Å)exp	n	n'
* 2522	6	7	* 2522	8	11
3892	7	8	* 4562	9	11
2306	7	9	3435	9	12
3308	8	10	* 4562	10	13

* Blend

The agreement between the observed and their quoted theoretical wavelengths for these lines is good.

In their 1976 paper, Buchet and others report some of these observed hydrogenic transitions and two lines at λ 2562 Å and λ 2452 Å which they designate as having the respective transitions $6d$–$7p$ and $6p$–$7d$.

Accad, Pekeris, and Schiff have published theoretical wavelengths for the transitions $2s\ ^3S$–$np\ ^3P°$ (n=3 to 5) and, also, find satisfactory agreement with experimental values.

Buchet and his associates report the following new lines excited by the beam-foil technique "at an energy of 1.15 MeV/nucleon".

λ (Å)	Transition
382	1s 3d–1s 4f
442	1s 4f–1s 7g
535	1s 4f–1s 6g
826	1s 4f–1s 5g
949	1s 5g–1s 7h

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O VII

Config.	Desig.	J	Level	Interval
1s^2	1s^2 ^1S	0	0	
1s 2s	2s ^3S	1	4524640	
1s 2p	2p $^3P^{\circ}$	0	4585620	
		1	4585680	60
		2	4586230	550
1s 2s	2s ^1S	0	4587340+x	
1s 2p	2p $^1P^{\circ}$	1	4629200	
1s 3s	3s ^3S	1	5338820	
1s 3p	3p $^3P^{\circ}$	0,1,2	5355670	
1s 3s	3s ^1S	0	5356420	
1s 3d	3d ^3D	1	5364370	
		2	5364430	60
		3	5364440	10
1s 3d	3d ^1D	2	5365470	
1s 3p	3p $^1P^{\circ}$	1	5368550	
1s 4s	4s ^3S	1	5616100	
1s 4p	4p $^3P^{\circ}$	0,1,2	5622600	
1s 4d	4d ^3D	1,2,3	5626280	
1s 4d	4d ^1D	2	5626670	
1s 4p	4p $^1P^{\circ}$	1	5628100	
1s 5p	5p $^3P^{\circ}$	0,1,2	5745440	
1s 5d	5d ^3D	1,2,3	5747420	
1s 5d	5d ^1D	2	5748230	
1s 5p	5p $^1P^{\circ}$	1	5748450	
1s 6p	6p $^3P^{\circ}$	0,1,2	5811730	
1s 6d	6d ^3D	1,2,3	5813070	
1s 6d	6d ^1D	2	5813680	

O VII

Config.	Desig.	J	Level	Interval
1s 6p	6p $^1P^{\circ}$	1	5813950	
1s 7p	7p $^3P^{\circ}$	0,1,2	5851890	
1s 7p	7p $^1P^{\circ}$	1	5852740	
1s 7d	7d ^3D	1,2,3	5853660	
1s 8p	8p $^3P^{\circ}$	0,1,2	[5877800]	
1s 8d	8d ^3D	1,2,3	5878400	
1s 9d	9d ^3D	1,2,3	5892950	
1s 9p	9p $^3P^{\circ}$	0,1,2	[5894500]	
1s 10p	10p $^3P^{\circ}$		[5907800]	
1s 10d	10d ^3D	1,2,3,	[5910500]	
O VIII ($^2S_{01/2}$)	*Limit*		**5962800**	
2p^2	2p^2 ^3P	0,1,2	9745140	
2p^2	2p^2 ^1D	2	9788360	
2p^2	2p^2 ^1S	0	9836180	
2p 3p	^1P	1	10592230	
2s 2p	$^3P^{\circ}$	0,1,2	10593340	
2s 2p	$^1P^{\circ}$	1	10593340+x	
2p 3p	^3P		10616980	
2p 3d	$^3D^{\circ}$		10620410	
2s 4p	$^3P^{\circ}$		10873850	
2p 3p	^3D		11508500+x	
3p^2	^3P		11533850	
3p 4p	^3P		11832770	
3p 4p	^1P		11845650	

June 1978.

Part B

OXYGEN

O VII ($Z=8$)

I P 739.274±0.037 eV. Limit 5962800±300 cm^{-1} 16.771 Å (Vac)

Anal B List A June 1978

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P Predicted Wavelength

‡ Raie Ultime

* Blend

* and † Blend of O VII and Be III

* and § Blend of O VII and O VI

O VII

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
22.10	H		0.00	560.97	0-1	$1s^2\ {}^1S-2s\ {}^3S$ IF
21.807	A	3	0.00	568.54	0-1	$1s^2\ {}^1S-2p\ {}^3P^\circ$ 1
21.6020‡	C		0.00	573.93	0-1	$1s^2\ {}^1S-2p\ {}^1P^\circ$ 2
18.627	E		0.00	665.60	0-1	$1s^2\ {}^1S-3p\ {}^1P^\circ$ 3
17.768	E		0.00	697.78	0-1	$1s^2\ {}^1S-4p\ {}^1P^\circ$ 4
17.396	E		0.00	712.70	0-1	$1s^2\ {}^1S-5p\ {}^1P^\circ$ 5
17.200	E		0.00	720.82	0-1	$1s^2\ {}^1S-6p\ {}^1P^\circ$ 6
17.086	A	1	0.00	725.63	0-1	$1s^2\ {}^1S-7p\ {}^1P^\circ$ 7
1623.63	D		560.97	568.61	1-2	$2s\ {}^3S-2p\ {}^3P^\circ$ 8
1638.30	D		560.97	568.54	1-1	
1639.87	D		560.97	568.53	1-0	
120.333	A	66	560.97	664.00	1-	$2s\ {}^3S-3p\ {}^3P^\circ$ 9
91.078	A	30	560.97	697.10	1-	$2s\ {}^3S-4p\ {}^3P^\circ$ 10
81.914	A	10	560.97	712.33	1-	$2s\ {}^3S-5p\ {}^3P^\circ$ 11
77.695	A	3	560.97	720.54	1-	$2s\ {}^3S-6p\ {}^3P^\circ$ 12
75.344	A	2	560.97	725.52	1-	$2s\ {}^3S-7p\ {}^3P^\circ$ 13
73.9	G	P	560.97	728.74	1-	$2s\ {}^3S-8p\ {}^3P^\circ$ 14
73.0	G	P	560.97	730.81	1-	$2s\ {}^3S-9p\ {}^3P^\circ$ 15
72.3	G	P	560.97	732.45	1-	$2s\ {}^3S-10p\ {}^3P^\circ$ 16
16.478	B		560.97	1313	1-	$2s\ {}^3S-2s\ 2p\ {}^3P^\circ$ 17
15.750	B		560.97	1348	1-	$2s\ {}^3S-2s\ 4p\ {}^3P^\circ$ 18

O VII

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
132.831	A	13	568.51	661.91	-1	$2p\ {}^3P^\circ-3s\ {}^3S$ 19
128.500	F	(0)	568.61	665.09	2-3	$2p\ {}^3P^\circ-3d\ {}^3D$ 20
*128.412	F	(00)	568.54	665.09	1-2	
*128.412	F	(00)	568.53	665.08	0-1	
97.076	A	1	568.58	696.29	-1	$2p\ {}^3P^\circ-4s\ {}^3S$ 21
96.126	A	68	568.58	697.55	-	$2p\ {}^3P^\circ-4d\ {}^3D$ 22
86.100	A	29	568.58	712.57		$2p\ {}^3P^\circ-5d\ {}^3D$ 23
81.494	A	10	568.58	720.71		$2p\ {}^3P^\circ-6d\ {}^3D$ 24
78.884	A	4	568.58	725.74		$2p\ {}^3P^\circ-7d\ {}^3D$ 25
77.374	A	1	568.58	728.81		$2p\ {}^3P^\circ-8d\ {}^3D$ 26
76.513	A	1	568.58	730.61		$2p\ {}^3P^\circ-9d\ {}^3D$ 27
75.5	G	P	568.58	732.79		$2p\ {}^3P^\circ-10d\ {}^3D$ 28
*19.383	B		568.58	1208		$2p\ {}^3P^\circ-2p^2\ {}^3P$ 29
16.581	B		568.58	1316		$2p\ {}^3P^\circ-2p\ 3p\ {}^3P$ 30
16.650	B		568.74	1313	0-1	$2s\ {}^1S-2s\ 2p\ {}^1P^\circ$ 31
137.51	I		573.93	664.09	1-0	$2p\ {}^1P^\circ-3s\ {}^1S$ 32
135.820	A	48	573.93	665.22	1-2	$2p\ {}^1P^\circ-3d\ {}^1D$ 33
*100.254†	A		573.93	697.60	1-2	$2p\ {}^1P^\circ-4d\ {}^1D$ 34
89.363	A	10	573.93	712.67	1-2	$2p\ {}^1P^\circ-5d\ {}^1D$ 35
84.425	A	1	573.93	720.79	1-2	$2p\ {}^1P^\circ-6d\ {}^1D$ 36
*19.383	B		573.93	1213	1-2	$2p\ {}^1P^\circ-2p^2\ {}^1D$ 37

O VII—Continued

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac 19.205	B		573.93	1220	1-0	2p ^{1}P°-2p^2 ^{1}S 38
16.770	B		573.93	1313	1-1	2p ^{1}P°-2p 3p ^{1}P 39
16.186	B		664.00	1430		3p ^{3}P°-3p^2 ^{3}P 40
*15.439	B		664.00	1467		3p ^{3}P°-3p 4p ^{3}P 41
Vac *15.439	B		665.60	1469	1-1	3p ^{1}P°-3p 4p ^{1}P 42
*114.25§	J		1208	1317		2p^2 ^{3}P-2p 3d ^{3}D° 43
*109.27§	J		1313	1427		2s 2p ^{3}P°-2p 3p ^{3}D 44

NSRDS-NBS 3, SECTION 8

OXYGEN $Z=8$

Part A

OXYGEN

O VIII

H I sequence; 1 electron $Z=8$

Ground state 1*s* $^2S_{0½}$

1*s* $^2S_{0½}$ **7028394** cm^{-1}; 14.228 Å (Vac) I P 871.387 eV

In 1940, F. Tyrén reported the Lyman line 1*s* ^{2}S–2*p* ^{2}P° as observed for the first time.

The terms in the table are those derived by J.D. Garcia and J.E. Mack as part of their extensive calculations of H-like spectra to Ca XX. Their values refer to the isotope ^{8}O for which they used R=109733.54530.

B. Edlén has, also, calculated centre-of-gravity wavelengths of the Lyman lines 1*s*–*np*, *n*=2 to 7, for the natural isotope mixture, but the difference is negligible in the case of O VIII.

REFERENCES

F. Tyrén, Nova Acta Reg. Soc. Sci. Uppsala [IV] **12**, No. 1, 24 (1940). C L

J. D. Garçia and J. E. Mack, J. Opt. Soc. Am. **55**, No. 6, 654-685 (1965). I P, T, C L

B. Edlén, Ark. Fys. (Stockholm) **31**, No. 35, 509-510 (1966). C L

O VIII

Config.	Desig.		*J*	Level	Interval
1*s*	1*s* ^{2}S		0½	0	
2*p*		2*p* ^{2}P°	0½	5270782	73
2*s*	2*s* ^{2}S		0½	5270855	1429
2*p*		2*p* ^{2}P°	1½	5272284	
3*p*		3*p* ^{2}P°	0½	6247399	22
3*s*	3*s* ^{2}S		0½	6247421	423
3*p*, 3*d*	3*d* ^{2}D	3*p* ^{2}P°	1½	6247844	148
3*d*	3*d* ^{2}D		2½	6247992	
4*p*		4*p* ^{2}P°	0½	6589154	10
4*s*	4*s* ^{2}S		0½	6589164	178
4*p*, 4*d*	4*d* ^{2}D	4*p* ^{2}P°	1½	6589342	62
4*d*, 4*f*	4*d* ^{2}D	4*f* ^{2}F°	2½	6589404	32
4*f*		4*f* ^{2}F°	3½	6589436	
5*p*		5*p* ^{2}P°	0½	6747312	5
5*s*	5*s* ^{2}S		0½	6747317	91
5*p*, 5*d*	5*d* ^{2}D	5*p* ^{2}P°	1½	6747408	32
5*d*, 5*f*	5*d* ^{2}D	5*f* ^{2}F°	2½	6747440	16
5*f*, 5*g*	5*g* ^{2}G	5*f* ^{2}F°	3½	6747456	10
5*g*	5*g* ^{2}G		4½	6747466	
6*p*		6*p* ^{2}P°	0½	6833214	3
6*s*	6*s* ^{2}S		0½	6833217	53
6*p*, 6*d*	6*d* ^{2}D	6*p* ^{2}P°	1½	6833270	18
6*d*, 6*f*	6*d* ^{2}D	6*f* ^{2}F°	2½	6833288	9
6*f*, 6*g*	6*g* ^{2}G	6*f* ^{2}F°	3½	6833297	6
6*g*, 6*h*	6*g* ^{2}G	6*h* ^{2}H°	4½	6833303	4
		6*h* ^{2}H°	5½	6833307	

O VIII

Config.	Desig.		*J*	Level	Interval
7*p*		7*p* ^{2}P°	0½	6885005	2
7*s*	7*s* ^{2}S		0½	6885007	33
7*p*, 7*d*	7*d* ^{2}D	7*p* ^{2}P°	1½	6885040	12
7*d*, 7*f*	7*d* ^{2}D	7*f* ^{2}F°	2½	6885052	6
7*f*, 7*g*	7*g* ^{2}G	7*f* ^{2}F°	3½	6885058	3
7*g*, 7*h*	7*g* ^{2}G	7*h* ^{2}H°	4½	6885061	2
7*h*, 7*i*	7*i* ^{2}I	7*h* ^{2}H°	5½	6885063	2
7*i*	7*i* ^{2}I		6½	6885065	
8*p*		8*p* ^{2}P°	0½	6918617	1
8*s*	8*s* ^{2}S		0½	6918618	22
8*d*	8*d* ^{2}D		1½	6918640	1
8*p*		8*p* ^{2}P°	1½	6918641	7
8*d*, 8*f*	8*d* ^{2}D	8*f* ^{2}F°	2½	6918648	4
8*f*, 8*g*	8*g* ^{2}G	8*f* ^{2}F°	3½	6918652	3
8*g*, 8*h*	8*g* ^{2}G	8*h* ^{2}H°	4½	6918655	1
8*h*, 8*i*	8*i* ^{2}I	8*h* ^{2}H°	5½	6918656	1
8*i*, 8*k*	8*i* ^{2}I	8*k* ^{2}K°	6½	6918657	1
8*k*		8*k* ^{2}K°	7½	6918658	
9*p*		9*p* ^{2}P°	0½	6941660	1
9*s*	9*s* ^{2}S		0½	6941661	15
9*p*, 9*d*	9*d* ^{2}D	9*p* ^{2}P°	1½	6941676	6
9*d*, 9*f*	9*d* ^{2}D	9*f* ^{2}F°	2½	6941682	3
9*f*, 9*g*	9*g* ^{2}G	9*f* ^{2}F°	3½	6941685	1
9*g*, 9*h*	9*g* ^{2}G	9*h* ^{2}H°	4½	6941686	1
9*h*, 9*i*	9*i* ^{2}I	9*h* ^{2}H°	5½	6941687	1
9*i*, 9*k*	9*i* ^{2}I	9*k* ^{2}K°	6½	6941688	1
9*k*, 9*l*	9*l* ^{2}L	9*k* ^{2}K°	7½	6941689	0
9*l*	9*l* ^{2}L		8½	6941689	

O VIII—Continued

Config.	Desig.		*J*	Level	Interval
10*p*		10*p* ^{2}P°	0½	6958141	1
10*s*	10*s* ^{2}S		0½	6958142	11
10*p*, 10*d*	10*d* ^{2}D	10*p* ^{2}P°	1½	6958153	4
10*d*, 10*f*	10*d* ^{2}D	10*f* ^{2}F°	2½	6958157	2
10*f*, 10*g*	10*g* ^{2}G	10*f* ^{2}F°	3½	6958159	2
10*g*, 10*h*	10*g* ^{2}G	10*h* ^{2}H°	4½	6958161	0
10*h*, 10*i*	10*i* ^{2}I	10*h* ^{2}H°	5½	6958161	1
10*i*, 10*k*	10*i* ^{2}I	10*k* ^{2}K°	6½	6958162	0
10*k*, 10*l*	10*l* ^{2}L	10*k* ^{2}K°	7½	6958162	1
10*l*, 10*m*	10*l* ^{2}L	10*m* ^{2}M°	8½	6958163	0
10*m*		10*m* ^{2}M°	9½	6958163	
11*p*		11*p* ^{2}P°	0½	6970335	1
11*s*	11*s* ^{2}S		0½	6970336	16
etc.			10½	to 52	
12*s*, 12*p*	12*s* ^{2}S	12*p* ^{2}P°	0½	6979610	12
etc.			11½	to 22	
13*s*, 13*p*	13*s* ^{2}S	13*p* ^{2}P°	0½	6986827	10
etc.			12½	to 37	
14*p*		14*p* ^{2}P°	0½	6992553	1
14*s*	14*s* ^{2}S		0½	6992554	8
etc.			13½	to 62	

O VIII—Continued

Config.	Desig.		*J*	Level	Interval
15*s*, 15*p*	15*s* ^{2}S	15*p* ^{2}P°	0½	6997173	7
etc.			14½	to 80	
16*s*, 16*p*	16*s* ^{2}S	16*p* ^{2}P°	0½	7000954	6
etc.			15½	to 60	
17*s*, 17*p*	17*s* ^{2}S	17*p* ^{2}P°	0½	7004088	4
etc.			16½	to 92	
18*s*, 18*p*	18*s* ^{2}S	18*p* ^{2}P°	0½	7006713	4
etc.			17½	to 17	
19*s*, 19*p*	19*s* ^{2}S	19*p* ^{2}P°	0½	7008936	3
etc.			18½	to 39	
20*s*, 20*p*	20*s* ^{2}S	20*p* ^{2}P°	0½	7010833	3
etc.			19½	to 36	
	....		......	....	
	∞=*Limit*		......	**7028394**	

March 1971.

Part B

OXYGEN

O VIII (Z=8)

I P 871.387 eV Limit 7028394 cm^{-1} 14.228 Å (Vac)

Anal A List B March 1971

REFERENCES

A J. D. Garcia and J. E. Mack, J. Opt. Soc. Am. **55**, No. 6, 654 to 685 (1965). I P, T, C L; W L 14 Å to 13865 Å (all wavelengths are from theoretical calculations of H-like spectra. For unresolved groups the wavelength has been derived from "the wave number of the statistically-weighed mean of all components."

B. Edlén, Ark. Fys. (Stockholm) **31**, No. 35, 509-510 (1966). C L.

O VIII

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
18.9671	A		0.00	653.66	0½–1½	$1s\ ^2S-2p\ ^2P^\circ$
18.9725	A		0.00	653.48	0½–0½	1
16.0055	A		0.00	774.61	0½–0½	$1s\ ^2S-3p\ ^2P^\circ$
16.0067	A		0.00	774.56	0½–0½	2
15.1760	A		0.00	816.95	0½–1½	$1s\ ^2S-4p\ ^2P^\circ$
15.1765	A		0.00	816.93	0½–0½	3
14.8205	A		0.00	836.55	0½–1½	$1s\ ^2S-5p\ ^2P^\circ$
14.8207	A		0.00	836.54	0½–0½	4
14.6343	A		0.00	847.20	0½–1½	$1s\ ^2S-6p\ ^2P^\circ$
14.6344	A		0.00	847.19	0½–0½	5
14.5242	A		0.00	853.61	0½–1½	$1s\ ^2S-7p\ ^2P^\circ$
14.5243	A		0.00	853.61	0½–0½	6
14.4537	A		0.00	857.78	0½–1½	$1s\ ^2S-8p\ ^2P^\circ$
14.4538	A		0.00	857.78	0½–0½	7
14.4057	A		0.00	860.64	0½–1½	$1s\ ^2S-9p\ ^2P^\circ$
14.4058	A		0.00	860.63	0½–0½	8
14.3716	A		0.00	862.68	0½–1½	$1s\ ^2S-10p\ ^2P^\circ$
14.3717	A		0.00	862.68	0½–0½	9
14.3465	A		0.00	864.19	0½–	$1s\ ^2S-11p\ ^2P^\circ$ 10
14.3274	A		0.00	865.34	0½–	$1s\ ^2S-12p\ ^2P^\circ$ 11
14.3126	A		0.00	866.23	0½–	$1s\ ^2S-13p\ ^2P^\circ$ 12
14.3009	A		0.00	866.94	0½–	$1s\ ^2S-14p\ ^2P^\circ$ 13

O VIII

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
14.2915	A		0.00	867.52	0½–	$1s\ ^2S-15p\ ^2P^\circ$ 14
14.2838	A		0.00	867.99	0½–	$1s\ ^2S-16p\ ^2P^\circ$ 15
14.2774	A		0.00	868.37	0½–	$1s\ ^2S-17p\ ^2P^\circ$ 16
14.2720	A		0.00	868.70	0½–	$1s\ ^2S-18p\ ^2P^\circ$ 17
14.2675	A		0.00	868.97	0½–	$1s\ ^2S-19p\ ^2P^\circ$ 18
14.2636	A		0.00	869.21	0½–	$1s\ ^2S-20p\ ^2P^\circ$ 19
102.550	A		653.66	774.56	1½–0½	$2p\ ^2P^\circ-3s\ ^2S$
102.392	A		653.48	774.56	0½–0½	20
102.490	A		653.66	774.63	1½–2½	$2p\ ^2P^\circ-3d\ ^2D$
102.348	A		653.48	774.61	0½–1½	21
102.505	A		653.66	774.61	1½–1½	
75.937	A		653.66	816.93	1½–0½	$2p\ ^2P^\circ-4s\ ^2S$
75.851	A		653.48	816.93	0½–0½	22
75.886	A		653.60	816.96		$2p\ ^2P^\circ-4d\ ^2D$ etc. 23 etc.
67.795	A		653.66	836.54	1½–0½	$2p\ ^2P^\circ-5s\ ^2S$
67.726	A		653.48	836.54	0½–0½	24
67.758	A		653.60	836.55		$2p\ ^2P^\circ-5d\ ^2D$ etc. 25 etc.

O VIII—Continued

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
64.064	A		653.66	847.19	1½-0½	$2p\ ^2P^{\circ}-6s\ ^2S$
64.003	A		653.48	847.19	0½-0½	26
64.032	A		653.60	847.20		$2p\ ^2P^{\circ}-6d\ ^2D$
						etc. 27 etc.
62.007	A		653.66	853.61	1½-0½	$2p\ ^2P^{\circ}-7s\ ^2S$
61.949	A		653.48	853.61	0½-0½	28
61.977	A		653.60	853.62		$2p\ ^2P^{\circ}-7d\ ^2D$
						etc. 29 etc.
60.741	A		653.66	857.78	1½-0½	$2p\ ^2P^{\circ}-8s\ ^2S$
60.686	A		653.48	857.78	0½-0½	30
60.713	A		653.60	857.78		$2p\ ^2P^{\circ}-8d\ ^2D$
						etc. 31 etc.
59.903	A		653.66	860.63	1½-0½	$2p\ ^2P^{\circ}-9s\ ^2S$
59.849	A		653.48	860.63	0½-0½	32
59.875	A		653.60	860.64		$2p\ ^2P^{\circ}-9d\ ^2D$
						etc. 33 etc.
59.317	A		653.66	862.68	1½-0½	$2p\ ^2P^{\circ}-10s\ ^2S$
59.264	A		653.48	862.68	0½-0½	34
59.290	A		653.60	862.68		$2p\ ^2P^{\circ}-10d\ ^2D$
						etc. 35 etc.
58.891	A		653.66	864.19	1½-0½	$2p\ ^2P^{\circ}-11s\ ^2S$
58.839	A		653.48	864.19	0½-0½	36
58.865	A		653.60	864.19		$2p\ ^2P^{\circ}-11d\ ^2D$
						etc. 37 etc.
58.571	A		653.66	865.34	1½-0½	$2p\ ^2P^{\circ}-12s\ ^2S$
58.520	A		653.48	865.34	0½-0½	38
58.545	A		653.60	865.34		$2p\ ^2P^{\circ}-12d\ ^2D$
						etc. 39 etc.
58.325	A		653.66	866.23	1½-0½	$2p\ ^2P^{\circ}-13s\ ^2S$
58.274	A		653.48	866.23	0½-0½	40
58.299	A		653.60	866.24		$2p\ ^2P^{\circ}-13d\ ^2D$
						etc. 41 etc.
58.130	A		653.66	866.94	1½-0½	$2p\ ^2P^{\circ}-14s\ ^2S$
58.080	A		653.48	866.94	0½-0½	42
58.105	A		653.60	866.94		$2p\ ^2P^{\circ}-14d\ ^2D$
						etc. 43 etc.
57.975	A		653.66	867.52	1½-0½	$2p\ ^2P^{\circ}-15s\ ^2S$
57.924	A		653.48	867.52	0½-0½	44
57.950	A		653.60	867.52		$2p\ ^2P^{\circ}-15d\ ^2D$
						etc. 45 etc.
102.355	A		653.49	774.61	0½-1½	$2s\ ^2S-3p\ ^2P^{\circ}$
102.402	A		653.49	774.56	0½-0½	46

O VIII—Continued

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
75.845	A		653.49	816.95	0½-1½	$2s\ ^2S-4p\ ^2P^{\circ}$
75.855	A		653.49	816.93	0½-0½	47
67.725	A		653.49	836.55	0½-1½	$2s\ ^2S-5p\ ^2P^{\circ}$
67.730	A		653.49	836.54	0½-0½	48
64.003	A		653.49	847.20	0½-1½	$2s\ ^2S-6p\ ^2P^{\circ}$
64.006	A		653.49	847.19	0½-0½	49
61.951	A		653.49	853.61	0½-1½	$2s\ ^2S-7p\ ^2P^{\circ}$
61.952	A		653.49	853.61	0½-0½	50
60.687	A		653.49	857.78	0½-1½	$2s\ ^2S-8p\ ^2P^{\circ}$
60.688	A		653.49	857.78	0½-0½	51
59.851	A		653.49	860.64	0½-	$2s\ ^2S-9p\ ^2P^{\circ}$
						52
59.266	A		653.49	862.68	0½-1½	$2s\ ^2S-10p\ ^2P^{\circ}$
59.267	A		653.49	862.68	0½-0½	53
292.980	A		774.61	816.93	1½-0½	$3p\ ^2P^{\circ}-4s\ ^2S$
292.599	A		774.56	816.93	0½-0½	54
200.211	A		774.61	836.54	1½-0½	$3p\ ^2P^{\circ}-5s\ ^2S$
200.033	A		774.56	836.54	0½-0½	55
170.831	A		774.61	847.19	1½-0½	$3p\ ^2P^{\circ}-6s\ ^2S$
170.701	A		774.56	847.19	0½-0½	56
156.946	A		774.61	853.61	1½-0½	$3p\ ^2P^{\circ}-7s\ ^2S$
156.836	A		774.56	853.61	0½-0½	57
149.082	A		774.61	857.78	1½-0½	$3p\ ^2P^{\circ}-8s\ ^2S$
148.983	A		774.56	857.78	0½-0½	58
144.130	A		774.61	860.63	1½-0½	$3p\ ^2P^{\circ}-9s\ ^2S$
144.038	A		774.56	860.63	0½-0½	59
140.786	A		774.61	862.68	1½-0½	$3p\ ^2P^{\circ}-10s\ ^2S$
140.698	A		774.56	862.68	0½-0½	60
292.465	A		774.56	816.95	0½-1½	$3s\ ^2S-4p\ ^2P^{\circ}$
292.626	A		774.56	816.93	0½-0½	61
200.005	A		774.56	836.55	0½-1½	$3s\ ^2S-5p\ ^2P^{\circ}$
200.044	A		774.56	836.54	0½-0½	62
170.692	A		774.56	847.20	0½-1½	$3s\ ^2S-6p\ ^2P^{\circ}$
170.709	A		774.56	847.19	0½-0½	63
156.833	A		774.56	853.61	0½-1½	$3s\ ^2S-7p\ ^2P^{\circ}$
156.842	A		774.56	853.61	0½-0½	64
292.775			774.62	816.96		$3d\ ^2D-4f\ ^2F^{\circ}$
						etc. 65 etc.
200.151			774.62	836.56		$3d\ ^2D-5f\ ^2F^{\circ}$
						etc. 66 etc.

O VIII—Continued

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
170.798			774.62	847.20		$3d\ ^2D-6f\ ^2F^{\circ}$ etc. 67 etc.
156.922			774.62	853.62		$3d\ ^2D-7f\ ^2F^{\circ}$ etc. 68 etc.
149.062			774.62	857.78		$3d\ ^2D-8f\ ^2F^{\circ}$ etc. 69 etc.
144.113			774.62	860.64		$3d\ ^2D-9f\ ^2F^{\circ}$ etc. 70 etc.
140.770			774.62	862.68		$3d\ ^2D-10f\ ^2F^{\circ}$ etc. 71 etc.
633.012	A		816.95	836.54	1½-0½	$4p\ ^2P^{\circ}-5s\ ^2S$
632.259	A		816.93	836.54	0½-0½	72
410.046	A		816.95	847.19	1½-0½	$4p\ ^2P^{\circ}-6s\ ^2S$
409.730	A		816.93	847.19	0½-0½	73
338.221	A		816.95	853.61	1½-0½	$4p\ ^2P^{\circ}-7s\ ^2S$
338.006	A		816.93	853.61	0½-0½	74
303.697	A		816.95	857.78	1½-0½	$4p\ ^2P^{\circ}-8s\ ^2S$
303.523	A		816.93	857.78	0½-0½	75
283.834	A		816.95	860.63	1½-0½	$4p\ ^2P^{\circ}-9s\ ^2S$
283.682	A		816.93	860.63	0½-0½	76
271.150	A		816.95	862.68	1½-0½	$4p\ ^2P^{\circ}-10s\ ^2S$
271.012	A		816.93	862.68	0½-0½	77
632.653	A		816.96	836.56		$4d\ ^2D-5f\ ^2F^{\circ}$ etc. 78 etc.
409.971	A		816.96	847.20		$4d\ ^2D-6f\ ^2F^{\circ}$ etc. 79 etc.
338.194	A		816.96	853.62		$4d\ ^2D-7f\ ^2F^{\circ}$ etc. 80 etc.
303.685	A		816.96	857.78		$4d\ ^2D-8f\ ^2F^{\circ}$ etc. 81 etc.
283.830	A		816.96	860.64		$4d\ ^2D-9f\ ^2F^{\circ}$ etc. 82 etc.

O VIII—Continued

I A	Ref	Int	E P Low	E P High	J	Multiplet No.
Vac						
271.149	A		816.96	862.68		$4d\ ^2D-10f\ ^2F^{\circ}$ etc. 83 etc.
1165.379	A		836.55	847.19	1½-0½	$5p\ ^2P^{\circ}-6s\ ^2S$
1164.077	A		836.54	847.19	0½-0½	84
726.749	A		836.55	853.61	1½-0½	$5p\ ^2P^{\circ}-7s\ ^2S$
726.243	A		836.54	853.61	0½-0½	85
584.078	A		836.55	857.78	1½-0½	$5p\ ^2P^{\circ}-8s\ ^2S$
583.751	A		836.54	857.78	0½-0½	86
514.793	A		836.55	860.63	1½-0½	$5p\ ^2P^{\circ}-9s\ ^2S$
514.538	A		836.54	860.63	0½-0½	87
474.532	A		836.55	862.68	1½-0½	$5p\ ^2P^{\circ}-10s\ ^2S$
474.316	A		836.54	862.68	0½-0½	88
1164.77	A		836.55	847.20		$5d\ ^2D-6f\ ^2F^{\circ}$ 89
726.644			836.55	853.62		$5d\ ^2D-7f\ ^2F^{\circ}$ 90
584.054			836.55	857.78		$5d\ ^2D-8f\ ^2F^{\circ}$ 91
514.796			836.55	860.64		$5d\ ^2D-9f\ ^2F^{\circ}$ 92
474.545			836.55	862.68		$5d\ ^2D-10f\ ^2F^{\circ}$ 93
1932.853	A		847.20	853.61	1½-0½	$6p\ ^2P^{\circ}-7s\ ^2S$
1930.763	A		847.19	853.61	0½-0½	94
1171.674	A		847.20	857.78	1½-0½	$6p\ ^2P^{\circ}-8s\ ^2S$
1170.905	A		847.19	857.78	0½-0½	95
922.586	A		847.20	860.63	1½-0½	$6p\ ^2P^{\circ}-9s\ ^2S$
922.109	A		847.19	860.63	0½-0½	96
800.820	A		847.20	862.68	1½-0½	$6p\ ^2P^{\circ}-10s\ ^2S$
800.461	A		847.19	862.68	0½-0½	97

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16. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

The present publication is the eighth Section of a series being prepared in response to the need for a current revision of two sets of the author's tables containing data on atomic spectra as derived from analyses of optical spectra. As in the previous Sections, Part A contains the atomic energy levels and Part B the multiplet tables. Section 8 includes these data for O VI, O VII, and O VIII, thereby completing the spectra of oxygen. The form of presentation is described in detail in the text to Section 1.

17. KEY WORDS *(six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)* Atomic energy levels, O VI - O VIII; atomic spectra, O VI - O VIII; multiplet tables, O VI - O VIII; oxygen, spectra, O VI - O VIII; spectra, O VI - O VIII; wavelengths, O VI - O VIII.

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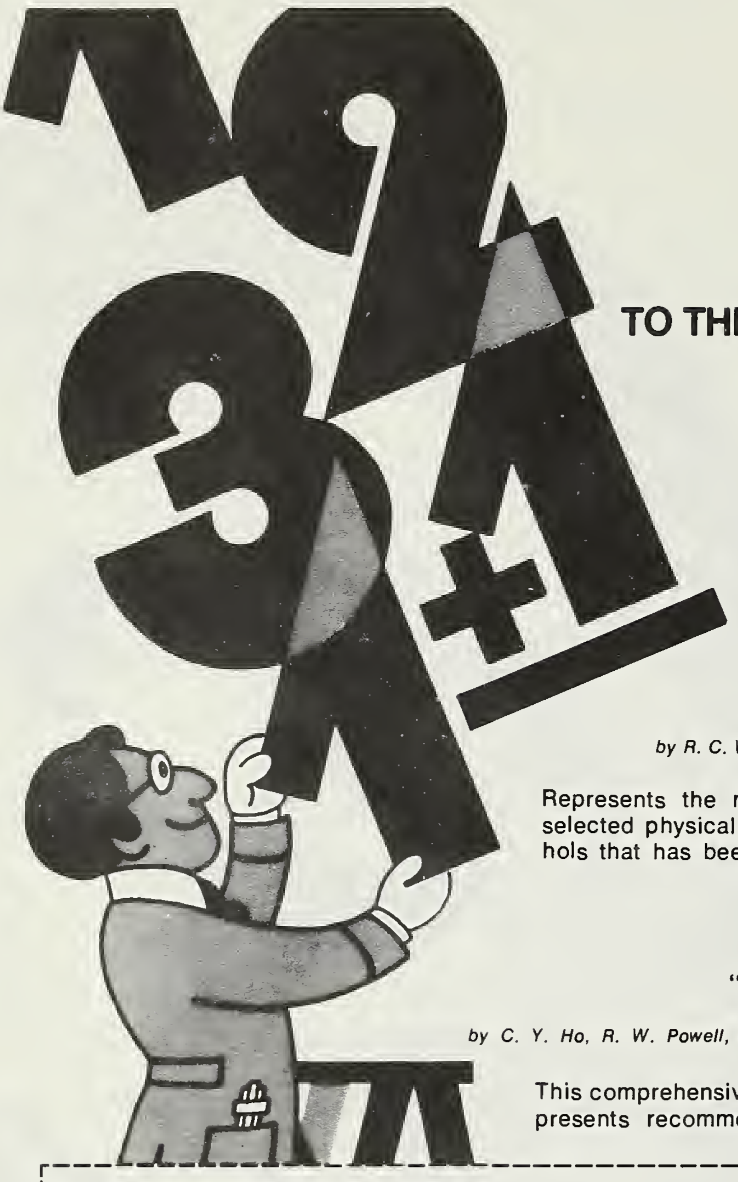

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